

WHAT IS CLAIMED IS:

1. A mammalian cell comprising a recombinant polynucleotide containing a nucleic acid sequence that encodes a telomerase reverse transcriptase protein, variant, or fragment having telomerase catalytic activity when complexed with a telomerase RNA,  
5 wherein the polynucleotide hybridizes under stringent conditions to a polynucleotide having a sequence complementary to SEQ ID NO:1, and wherein the expression of the protein, variant, or fragment from the recombinant polynucleotide in the cell increases proliferative capacity of the cell.
- 10 2. The cell of claim 1, which is a human cell.
3. The cell of claim 2, which further comprises a selectable marker gene.
4. The cell of claim 2, wherein the recombinant polynucleotide comprises a constitutive promoter.
- 15 5. The cell of claim 2, wherein the recombinant polynucleotide comprises an inducible promoter.
6. The cell of claim 2, which is a liver cell.
7. The cell of claim 6, which is a hepatocyte.
8. The cell of claim 2, which is a nerve cell.
- 20 9. The cell of claim 8, which is a glial cell, astrocyte, or oligodendrocyte.
10. The cell of claim 8, which is a neuron of the central nervous system.
11. The cell of claim 10, which is a cholinergic or adrenergic cell.

12. The cell of claim 2, which is a retinal pigmented epithelial cell.
13. The cell of claim 2, which is a contractile cell.
14. The cell of claim 13, which is a heart muscle cell or smooth muscle cell.
- 5 15. The cell of claim 2, which is a fat cell.
16. The cell of claim 2, which is a fibroblast.
17. The cell of claim 2, which is a vascular endothelial cell.
18. The cell of claim 2, which is a hormone secreting cell.
19. The cell of claim 18, wherein the cell secretes insulin or glucagon.
- 10 20. The cell of claim 18, which is a pituitary cell, thyroid hormone secreting cell, or adrenal cell.
21. The cell of claim 2, which is a fat storing cell.
22. The cell of claim 2, which is an epithelial or mucosal cell.
- 15 23. The cell of claim 22, which is an oral cavity cell, stomach cell, or intestinal cell.
24. The cell of claim 22, which is a mammary gland, uterus, or prostate cell.
25. The cell of claim 22, which is an air space epithelial cell of the lung.
26. The cell of claim 2, which is a tubular cell of the kidney.

27. The cell of claim 2, which is a blood cell or a cell of the immune system.

28. The cell of claim 27, which is a T or B lymphocyte.

29. The cell of claim 27, which is a mast cell or eosinophil.

5 30. The cell of claim 27, which is a monocyte or macrophage.

31. The cell of claim 2, which is an osteoblast, osteocyte, or osteoclast.

32. The cell of claim 2, which is a chondrocyte or sinovial cell.

33. The cell of claim 2, which is a stem cell.

34. The cell of claim 33, which is an embryonic stem cell.

10 35. The cell of claim 33, which is an embryonic germ cell.

36. The cell of claim 33, which is an adult stem cell.

37. The cell of claim 2, wherein the polynucleotide encodes a full-length, naturally occurring human telomerase reverse transcriptase.

15 38. The cell of claim 2, wherein the polynucleotide encodes a human telomerase reverse transcriptase having the amino acid sequence of SEQ ID NO:2.